PRELIMINARY RESULTS OF THE EFFECTS OF DAZOMET RATE AND INCORPORATION METHOD ON PEST MANAGEMENT IN SOUTHERN FOREST-TREE NURSERIES

Stephen W. Fraedrich* and L. David Dwinell

Southern forest tree nurseries have relied upon soil fumigation with methyl bromide for the production of high quality seedlings for the last 30-40 years. Dazomet (Basamid®) has been tested with success in western and northern forest-tree nurseries; however, this soil fumigant has not gained widespread acceptance as a replacement for methyl bromide in southern forest-tree nurseries. Recent studies in the West and North have indicated that the method of incorporation may influence the effectiveness of dazomet to control specific soilborne pests. Various other factors may also influence the efficacy of dazomet in southern nurseries including time and rate of application, and nursery soil conditions. The purpose of this study was to examine factors that may affect the performance of dazomet in southern pine nurseries. The impact of these factors on pine seedling production and quality, and control of soilborne fungi, nematodes, and weeds is being evaluated.

The study was established at a North Carolina Division of Forest Resources (NCDFR) nursery located in Morganton, NC and at a Georgia Forestry Commission (GFC) nursery located near Byromville, GA. Spring and fall applications of dazomet were evaluated at each nursery. Dazomet was applied at rates of 0, 250, and 500 lbs/acres. Two methods of incorporation of dazomet were tested: a rototiller with 8 inch tines and a Gramegna spading machine. Each treatment combination was replicated three times at the NCDFR nursery and four times at the GFC nursery. A methyl bromide treatment was also included, and methyl bromide was applied in the spring. Study plots were approximately 80' long and 3 beds (16' wide). All plots were sown with slash pine at the GFC nursery and with loblolly pine seeds at the NCDFR nursery. All cultural practices, including scheduled applications of fertilizers, water and herbicides, were conducted as performed operationally in each of the nurseries.

Seedling bed density was evaluated at 10-20 day intervals during the first 6-8 weeks after sowing. Seedling quality will be assessed at the end of the growing season. Potentially phytopathogenic fungi (*Pythium spp., Fusarium* spp.) and beneficial fungi (*Trichoderma* spp.) associated with the roots of seedlings in each of the treatments were assessed at mid-season. These evaluations were conducted in control and methyl bromide-treated plots, and plots in which dazomet was incorporated with the rototiller. The presence of plant parasitic nematodes in soil of study plots was assessed in June of 1997.

Georgia Forestry Commission Nursery. No significant differences in the number of seedlings were observed among treatments or incorporation methods for dazomet at the GFC nursery in either the fall- or spring-fumigated plots (Table 1). The methyl bromide fumigation was the only treatment to consistently reduce the number of nutsedge plants to levels below those found in controls. The

percentage of roots from which *Pythium* spp. were recovered was significantly greater in controls compared to other treatments; however, methyl bromide fumigation was the only treatment from which *Pythium* spp. were not isolated from roots. *Fusarium* spp. were isolated from the roots of most seedlings in all treatments. *Trichoderma* spp. were isolated from a greater number of seedlings in methyl bromide-treated plots as compared to plots that were fall-fumigated with dazomet. No differences were observed in the isolation of *Trichoderma* spp. among treatments for the spring fumigation with dazomet.

North Carolina Division of Forest Resources Nursery. A small but significantly greater number of seedlings per square foot was observed in the fall-treated dazomet (500lbs/ac) plots as compared to the methyl bromide-treated plots (Table 2). No other differences in seedling bed densities were observed among treatments applied in the fall or spring. Methyl bromide and the fall application of dazomet greatly reduced the number of weeds per plot relative to control plots. No significant differences were observed among treatments in the area of the nursery where dazomet was applied in the spring. Generally, weeds have not been a major concern in study plots at the NCDFR nursery. *Pythium* spp. were isolated significantly less frequently from roots of seedlings in the fall-fumigated plots treated with dazomet at 250lbs/acre as compared to controls. In the study area where dazomet was applied in the spring, *Pythium* spp. were isolated less frequently from seedlings in methyl bromide-treated plots as compared to seedlings from control plots. No other differences were observed among treatments in either the fall-fumigated or spring-fumigated areas. No differences were observed among treatments in the isolation of *Fusarium* spp. or *Trichoderma* spp. from the roots of seedlings.

Conclusions. Thus far, no major disease outbreaks or seedling losses have been observed at either nursery. The inability of dazomet to control nutsedge at the GFC nursery with the application methods and rates used in this study is a concern. This research work is continuing at the GFC and NCDFR nurseries. An important variable that will be addressed at lifting is seedling quality.

Table 1. Mean number of slash pine seedlings and nutsedge plants in plots treated with dazomet and methyl bromide at the Georgia Forestry Commission nursery near Byromville, GA. (June, 1997)

Treatment	Number of seedlings/ sq.ft.[a]	Nutsedge plants/ sq.ft.[a]
Fall fumigation		
Control	29.5 a	5.3 a
Dazomet (250lbs/ac)	28.9 a	2.1 ab
Dazomet (500lbs/ac)	30.4 a	1.1 b
Methyl Bromide[b]	29.9 a	0.2 b
Spring fumigation		
Control	30.0 a	9.1 a
Dazomet (250lbs/ac)	28.9 a	6.6 a
Dazomet (500lbs/ac)	29.3 a	3.3 ab
Methyl Bromide[b]	30.1 a	0.4 b

[a] Means followed by the same letter do not differ significantly according to Tukey=s Studentized Range Test($P<0.05$). Means based on 4 replications/treatment.
[b] Methyl bromide was applied in March, 1997

Table 2. Mean number of loblolly pine seedlings and weeds for plots treated with dazomet and methyl bromide at the North Carolina Division of Forest Resources nursery at Morganton, NC. June, 1997)

Treatment	Number of seedlings/ sq.ft.[a]	Number of weeds/plot[a]
Fall fumigation		
Control	22.9 ab	20.5 a
Dazomet (250lbs/ac)	24.0 ab	4.2 b
Dazomet (500lbs/ac)	24.9 a	4.8 b
Methyl Bromide[b]	22.7 b	8.0 b
Spring fumigation		
Control	23.3 a	4.0 a
Dazomet (250lbs/ac)	21.3 a	8.0 a
Dazomet (500lbs/ac)	20.7 a	5.3 a
Methyl Bromide[b]	22.9 a	4.0 a

[a] Means followed by the same letter do not differ significantly according to Tukey=s Studentized Range Test($P<0.05$). Means based on 3 replications/treatment.
[b] Methyl bromide was applied in May, 1997.